ISST Forum

4 March 2004

Outline

- Briefly highlight the goals of the Forum
- Review a few ISST accomplishments and activities
- Update on other new model data and DGEX
- Present updated ISST roadmap
- Discuss Analysis of Record (AOR)

Background of Forum

- ISST's effort to engage and inform partners and constituents (yet protect autonomy of group)

- Recognizes value of broad discussion, feedback and consensus building

- Directly solicits issues from field

- Can be used to discuss critical issues (as was used in December's Forum to discuss DGEX with Regions and NCEP)

ISST Accomplishments and Activities

- Worked to fill "transmission gaps" on the SBN through several proposals, now nearly implemented
  - Additional Eta 12 and GFS data
- Collaborated with MDL on their efforts to implement COOP and gridded MOS
  - Number of MOS sites increased by an order of magnitude
  - COOP MOS available for GFE ingest via MatchMOSAll
- Provided scientific critique and feedback on a number of critical issues:
  - 10-506 directive, NVIWT verification plan, Digital Services CONOPS team, and others
- Investigated and prioritized a spectrum of downscaling possibilities and reported to S&T Committee
- Conceived, developed, and championed the DGEX

Outline of New Model Data on the Way

- New data sets resulting from initial efforts at May 2003 WR SOO/DOH workshop
    - In place: Eta12 surface data through 84 hrs, 4 times/day
    - Work in progress: Additional GFS vertical data to 240 hrs (168 hours on 06Z and 18Z cycles)
- Previous requirements in place
    - OB3.2 goal: Full Eta12 through 84 hrs
    - OB4: Full GFS (adds additional fields)
- Proposed ISST solution to downscaling medium range model data for GFE
    - Downscaled GFS with Eta eXtension (DGEX)

Downscaled GFS with Eta Extension (DGEX)

- Background and Motivation:
  - Designed to bring quick relief to forecasters
  - Gives physically consistent and seamless option for high-resolution medium range grids
  - Analogous to downscaling GFS since GFS synoptic scale should dominate Eta solution within the small interior domain
  - Has received broad support from Regions
- Model Design:
  - Eta12 lateral boundary conditions (LBC) from GFS on small domains (CONUS and OCONUS)
  - Computing resources from consolidation of 0-84 hr Eta run
    - Start DGEX at 78 hr to allow for adjustment to smaller grid by 84 hr (first time available)
    - 78-174 hr uses 3-hr GFS LBC; 174-192 hr uses 6-hr GFS LBC
- Operational cycle times – run twice per day per grid:
  - 06 and 18Z (00 and 12Z GFS LBC) for CONUS
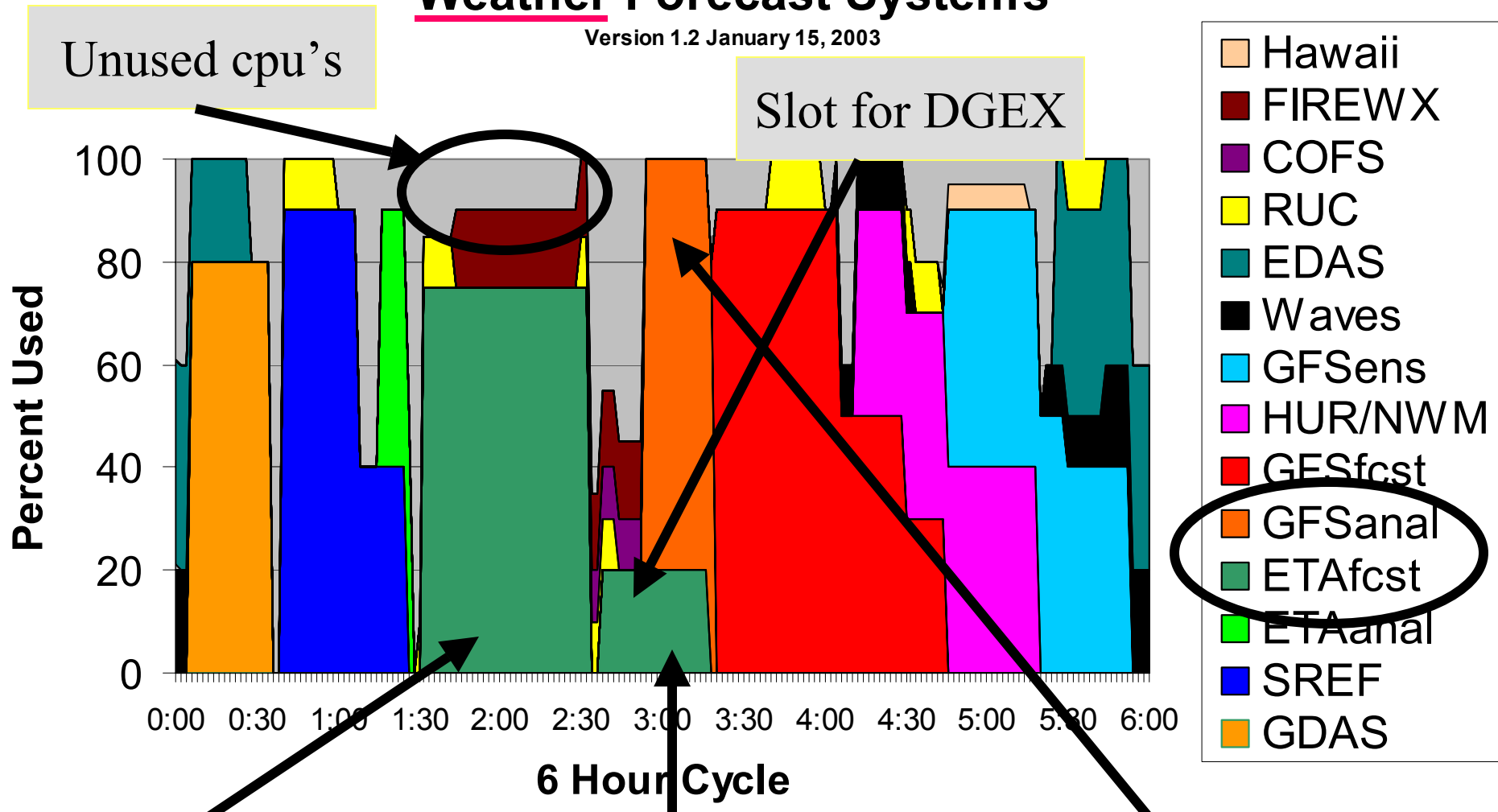 - 12 and 00Z (06 and 18Z GFS LBC) for OCONUS

DGEX (continued)

- Special characteristics:
  - This will be the first distributed data set that is specifically designed to support GFE/IFPS
    - Full model resolution
    - Enhanced boundary level data to aid in further downscaling
  - There will be a baseline set of SmartInit tools optimally designed to take advantage of the enhanced data set
    - Developed by Tim Barker (Boise)
    - If <u>unmodified</u> locally will give collaborating offices a consistent starting point

DGEX Parameter List

- Pressure at surface and MSL
- T and RH at 2 m, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- U and V wind at 10 m, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- Total Precip at surface
- Total Cloud Cover
- Max/Min temperature at 2 m
- Weather Smart Init fields
  - Probability of Freezing Precip
  - Probability of Frozen Precip
  - Probability of Thunderstorms
- Terrain height (only once - not every time-step)
- Synoptic parameters (for assessment of model synoptics):
  - Sea Level Pressure
  - 1000 mb Z
  - 850, 700, 500 mb Z, T, RH, U, V
  - 700 mb omega
  - 250 mb Z, U, V
  - Surface based lifted index

Proposed NCEP Production Suite
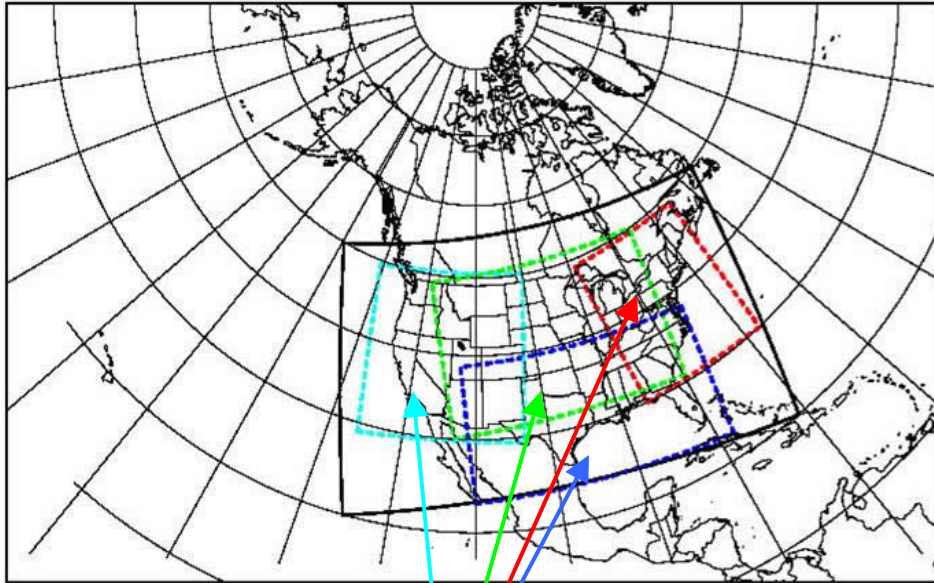## <u>Weather</u> Forecast Systems
Version 1.2 January 15, 2003

Unused cpu's

Slot for DGEX

| Hawaii |
| FIREWX |
| COFS |
| RUC |
| EDAS |
| Waves |
| GFSens |
| HUR/NWM |
| GESfcst |
| GFSanal |
| ETAfcst |
| ETAanal |
| SREF |
| GDAS |

Percent Used

6 Hour Cycle

Large block Eta 0-60hr

Small block Eta 60-84hr

GFS analysis

DGEX – Domains

CONUS Domain

Alaska Region Domain
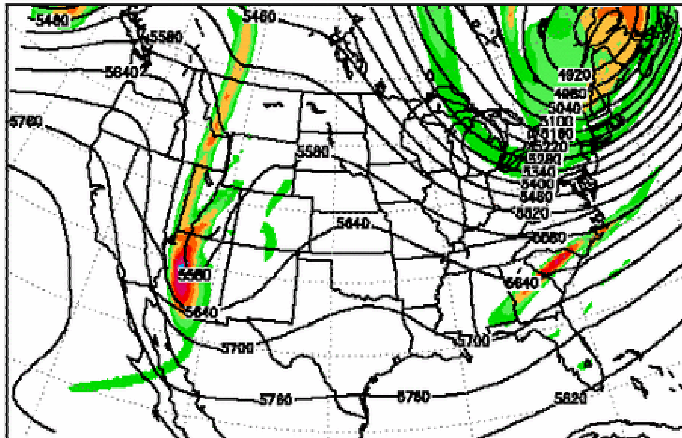
Regional Distribution Tiles
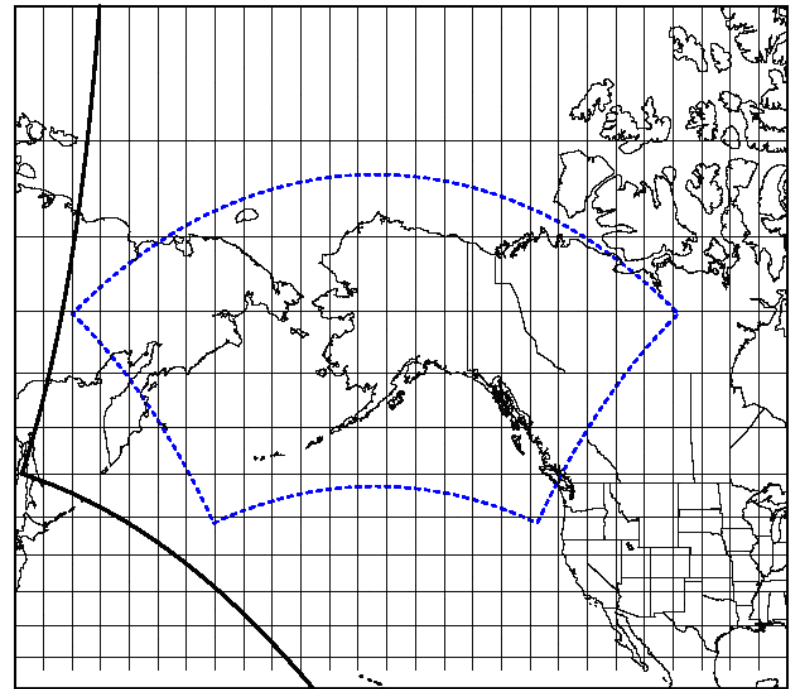
- Regional subsets only used to transmit files via ftp during evaluation period

- Final distribution will be on grid #218 with GRIB2 compression via new AWIPS SBN.

DGEX   vs. GFS (previous)

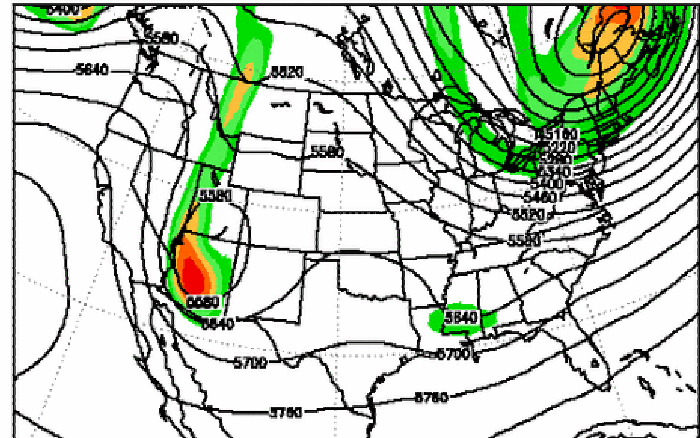http://wwwt.emc.ncep.noaa.gov/mmb/mmbpll/etapll8day/

500 mb ht/Vort
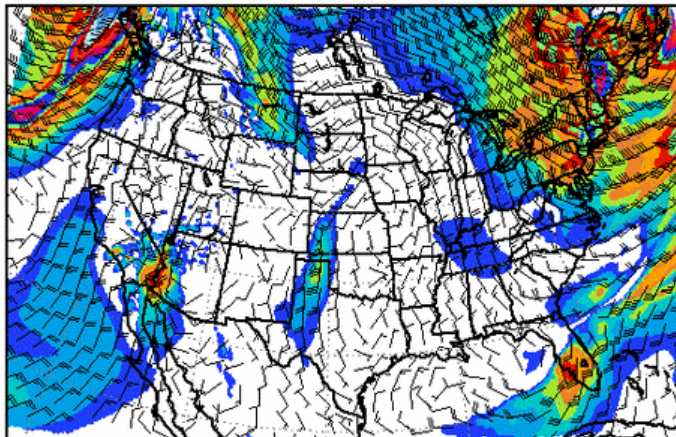
850 mb wind
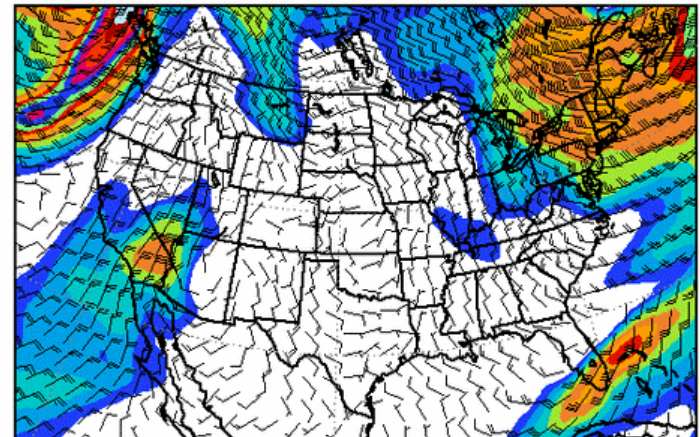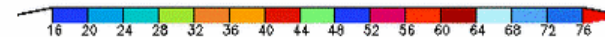
DGEX Timeline

- Mid March: CONUS and AR evaluation
    - Forecasters at a subset of WFOs to assess impact on operations
    - Better evaluation of internal drift issues (limited set of fields available via a webpage)
    - Test Regional WAN distribution method
    - HPC will perform model diagnostics

- Mid April: convergence of Eta runs complete and Eta extension running operationally

- Late May: DVB-S efforts free up SBN bandwidth

- June: OB3.2 upgrade to AWIPS configuration

- June: Eta extension operational via SBN using GRIB2

Updated ISST Roadmap

- New prioritized list of action topics:
  - Analysis of Record
  - Digital Services forecast process
  - Climatology
  - Downscaling (long-term solutions)
  - Review of 10-506 (preliminary review to OCWWS by late March)
  - Uncertainty and probabilistic information
- Short term actions (next 2-3 months):
  - Verification (NVIWT plan)
    - Have reviewed and will provide OS&T with feedback and prioritizations
    - Input to 10-102 (declaring elements official)

Ongoing Activities (monitoring)

- Grid change management
- GFE enhancements
- SBN data
  - GFS bottleneck on mainframe
- TCM (Tropical Cyclone Message)
- Gridded MOS

Analysis of Record
(A real-time, mesoscale analysis of all forecast grids)

- Lots of ideas and discussion, but effort must be organized quickly!
- Grid spacing must match highest-resolution forecasts
- Will have to mature from early prototype 2-d analysis of primary fields
- Impact of model used for first guess must be accounted for and minimized
- Observation system must be supported
- Some groups already designing systems to include analysis of record and associated analysis techniques

Analysis of Record (continued)

- This may prove to be the Holy Grail of the digital era

- Unfortunately, it is an integral part of:
  - The forecast process
  - Verification
  - Customer motivation and acceptance
  - Conditional climatologies
  - Statistical applications and bias corrections
  - Numerical weather prediction

Analysis of Record (continued)

- Seeking a solution
  - Charter a team to create an "Analysis of Record" Roadmap
    - Diverse team of experts (both within and outside NWS)
    - Seek assistance from research community
      - USWRP
      - CSTAR
      - COMET projects
    - Plan should thoroughly examine existing analysis systems for possible inclusion or modification
      - Inventory and coordinate Regional efforts already underway
    - Work in coordination with MDL and NCEP

Closing comments

- Good progress over past nine months
  - still learning and adjusting process as we go
- We endorse new efforts to develop Digital Services Project Office
  - desperately need program leadership
- Verification is critical to decision making process and must gain momentum